

## PATENT ABSTRACTS OF JAPAN

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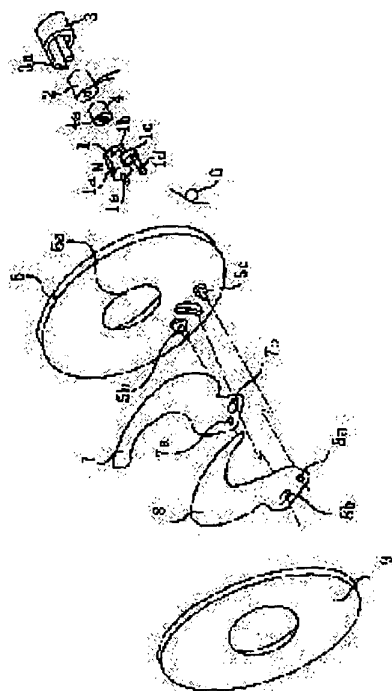
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(54) LIGHT QUANTITY CONTROLLER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a compact actuator which does not occupy a large area on a base plate, as for the actuator for a light quantity controller such as a shutter device and a diaphragm device, etc.

SOLUTION: The light quantity controller is provided with at least a magnet whose outer peripheral surface is divided in a peripheral direction so as to be alternately magnetized in different poles and which can be rotated around the center of rotation, a driving device constituted of a stator whose outside and inside magnetic pole parts energized by a coil arranged in the axial direction of the magnet face the outer and inner peripheral surfaces of the magnet and blade driving pins integrally formed with the magnet, a base plate with an aperture part formed, and light quantity control blades which are driven by the blade driving pins of the driving device so as to control the opening quantity of the aperture part in the base plate.



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CLAIMS

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[Claim(s)]

[Claim 1] The quantity of light adjustment characterized by providing the following. The outside magnetic pole section which is magnetized by turns by the pole where peripheral faces divide and differ in a hoop direction at least, is equipped with the magnet which can rotate focusing on the center of rotation, arranges a coil to the shaft orientations of this magnet, and is excited with the aforementioned coil. Driving gear with which the inside magnetic pole section consists of the stator and the aforementioned magnet which countered the peripheral face and the inner skin of the aforementioned magnet, and a wing drive pin constituted in one. The cope plate equipped with opening. The quantity of light regulation wing which drives by the wing drive pin of the aforementioned driving gear, and adjusts the amount of openings of opening of the aforementioned cope plate.

[Claim 2] The aforementioned wing drive pin which the outside magnetic pole section of the aforementioned stator was constituted in the quantity of light adjustment according to claim 1 by the gear tooth which counters only the predetermined angle range at the periphery section of the aforementioned magnet, and was constituted by the aforementioned magnet in one is a quantity of light adjustment characterized by being formed in the range of the magnet with which the aforementioned outside magnetic pole has not countered.

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to quantity of light adjustments, such as a shutter of a camera especially shutter equipment of a lens shutter camera, and a beam limiting device of a video camera.

[0002]

[Description of the Prior Art] There are some which are shown in drawing 5 as shutter equipment of the conventional lens shutter camera. A drive lever and 102a are the drive pins by which 101 was prepared in the permanent magnet and 102 was prepared in the drive lever. The drive lever 102 fixes to a permanent magnet 101, and is rotated in one with a permanent magnet 101. 103 is a coil and a stator which 104 and 105 consist of soft magnetic materials, and is excited with a coil. It is joined in 104a and 105a, and the stator 104 and the stator 105 are united on the magnetic circuit. A stator 104 and a stator 105 are excited by the energization to a coil 103, and a permanent magnet 101 carries out the rotation drive of the inside of a predetermined angle. 106 and 107 are shutter wings and 108 is a cope plate. In 106a and 107a, it is attached in the pins 108a and 108b of a cope plate 108 possible [ rotation ], and Slots 106b and 107b fit into the aforementioned drive pin 102a possible [ sliding ], the rotation drive of the shutter wings 106 and 107 is carried out a center [ the centers of rotation 106a and 107a ] because the drive lever 102 rotates with a permanent magnet 101, and the shutter wings 106 and 107 open and close non-illustrated opening.

[0003] In order to prevent a cost rise as other gestalten, there are some which formed the permanent magnet with the plastics magnet and fabricated the drive pin in one. 109 is a foreland board which holds the shutter wings 106 and 107 possible [ movement between cope plates 108 ], and 110 is a back cope plate which holds stators 104 and 105 and holds a permanent magnet 101 possible [ rotation ].

[0004]

[Problem(s) to be Solved by the Invention] It will become difficult for the above-mentioned shutter equipment to occupy many ranges of a cope plate by the coil or the stator, and to arrange other actuators, the guide rod of a lens, etc.

[0005] Moreover, in order to constitute the neighbors of the circumferential direction centering on an optical axis so that drive pin 102a may be moved to radial [ of the circle centering on an optical axis ], since it is occupied by the stator 104, the permanent magnet 101 of the above-mentioned shutter equipment must constitute drive pin 102a so that it may become the position which does not overlap a stator 104 about the shaft orientations of a permanent magnet 101. Since a drive pin will also be magnetized in many cases in the case of what fabricated drive pin 102a in one with the permanent magnet, if close to a stator, it will have a bad influence on output characteristics in that case.

[0006] The method of manufacturing a permanent magnet 101 and drive pin 102a with another quality of the material, and unifying this by adhesion or pressing fit through a drive lever etc. causes a cost rise, or has the inclination for an assembly error to arise between the phase of magnetization, and the position of a drive pin, and for output characteristics to become unstable.

[0007] Therefore, the purpose of this invention has the actuator of quantity of light adjustments, such as shutter equipment and a beam limiting device, in offering the compact thing which does not occupy many ranges on a cope plate.

[0008] Moreover, it is in output characteristics being stabilized by the purpose of this invention and moreover considering as the quantity of light adjustment of a low cost.

[0009]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is magnetized by turns by the pole where peripheral faces divide and differ at least in the 1st at a hoop direction, and is equipped with the magnet which can rotate focusing on the center of rotation. The driving gear with which the outside magnetic pole section which arranges a coil to the shaft orientations of this magnet, and is excited with the aforementioned coil, and the inside magnetic pole section consist of the stator and the aforementioned magnet which countered the peripheral face and inner skin of the aforementioned magnet, and a wing drive pin constituted in one, and the cope plate equipped with opening. It is characterized by having the quantity of light regulation wing which drives by the wing drive pin of the aforementioned driving gear, and adjusts the amount of openings of opening of the aforementioned cope plate.

[0010] Since the aforementioned coil is arranged in the above-mentioned composition at a magnet and shaft orientations Since it becomes the magnetic path which sandwiches a magnet in the outside magnetic pole section which serves as a compact actuator which does not occupy many ranges on a cope plate, and counters the peripheral face and inner skin of a magnet, and the inside magnetic pole section Since the line of magnetic force which magnetic reluctance generates with a coil few again acts on a magnet effectively, it can become the high actuator of an output and can consider as shutter equipment equipped with the operating characteristic compact [ as a result ] and stabilized.

[0011] Moreover, in order to solve the above-mentioned technical problem, it is characterized by to form the aforementioned wing drive pin by which the outside magnetic pole section of the aforementioned stator was further constituted by the 2nd the gear tooth

which counters only the predetermined angle range at the periphery section of the aforementioned magnet in addition to the 1st invention, and this invention was constituted by the aforementioned magnet in one in the range of the magnet with which the aforementioned outside magnetic pole has not countered.

[0012] Since a drive pin is located in the place left with the outside magnetic pole, even if it constitutes a drive pin from material of a permanent magnet, let electromagnetic force in the drive pin section to generate be the actuator by which did not affect the output characteristics of the whole magnet very small, but shutter equipment was stabilized.

[0013] Moreover, since a drive pin is fabricated in one with a magnet, it serves as a few assembly error by the low cost compared with the case where it consists of another parts. Moreover, since a drive pin can be arranged in the position which overlaps an outside magnetic pole about the axis of rotation of a magnet, the length of the shaft orientations of this outline cylindrical shape-like actuator can also be stopped low.

[0014]

[Example] (Example 1) Drawing 1 - drawing 4 are drawings showing the example of this invention, among those drawing 1 is the decomposition perspective diagram of a drawing wing drive, and drawing 2 is [ the A-A cross section of drawing 2 at the time of unenergizing and drawing 4 of a cross section and drawing 3 ] the A-A cross sections of drawing 2 at the time of the maximum energization in a coil.

[0015] It consists of plastics magnet material, and 1 is an outline cylindrical shape-like magnet, it divides a peripheral face into two at least at a circumferential direction, and is magnetized by the south pole and N pole. As for magnetization section 1a, the peripheral face is magnetized for the peripheral face by the south pole, as for N pole and magnetization section 1b.

[0016] 2 is a cylindrical shape-like coil, and coils 2 are the aforementioned magnet 1 and this heart, and a magnet 1 is arranged in a shaft-orientations next door \*\*\*\* position, and a coil 2 is the size as the outer diameter of the aforementioned magnet 1 with the almost same outer diameter.

[0017] 3 is the stator which consists of soft magnetic materials, and the stator 3 consists of container-liner 3b of the shape of an outer case and a pillar pilaster. As for the outer case of a stator 3, the point forms tooth form-like outside magnetic pole 3a. Outside magnetic pole 3a is constituted so that the peripheral face of a magnet 1 may be countered with a predetermined crevice only at a predetermined angle. In this example, the aforementioned predetermined angle is 180 or less degrees.

[0018] The opposite section 4b section is formed in the phase which bore section 4a fitted into container-liner 3b of a stator 3, and fixed 4 by the auxiliary stator, and countered outside magnetic pole 3a of the aforementioned stator at the outer-diameter section.

[0019] The inside magnetic pole consists of container-liner 3b of the shape of a cylindrical shape of a stator 3, and an auxiliary stator 4. Arm 1c is formed in the position which has not countered a magnet 1 with outside magnetic pole 3a in one, and wing drive pin 1d is formed at the nose of cam of arm 1c. Moreover, arm 1c is arranged in the position which overlaps outside magnetic pole 3a about the position of the shaft orientations of the magnet 1 which is an outline cylinder-like. Moreover, wing drive pin 1d, it is arranged so that outline movement may be carried out, radial [ which separate or it goes to the center of opening 5a of the below-mentioned cope plate 5 / the direction i.e., radial, ].

[0020] 5 is the cope plate of this quantity of light adjustment. The cope plate is equipped with opening 5a. Shank 1e fits in possible [ 1f of shanks / rotation in the hole 3c section of a stator 3 ] by fitting into the 5d section of a cope plate 5 possible [ rotation ], and the aforementioned magnet 1 is attached. The stator 3 is being fixed to the cope plate 5 in the outside magnetic pole 3a section.

[0021] As for 6, bore section 6c fits into dowel 5e of a cope plate 5 by the torsion spring, arm 6b is fixed to dowel 5f of a cope plate 5, and arm 6a energizes a magnet 1 in the direction of a clockwise rotation in drawing 3 in contact with pin 1g on arm 1c of a magnet 1. In this state, as for the arm of a magnet 1, arm 1c is stopped in contact with height 5e of a cope plate 5. This state that shows in drawing 3 is in the state where the energization to a coil 2 is not made.

[0022] 7 and 8 are quantity of light regulation wings, and Holes 7a and 8a have fitted into the pins 5b and 5c of a cope plate 5 possible [ rotation ], respectively. Moreover, Slots 7b and 8b have fitted into drive pin 1d of a magnet 1 possible [ sliding ], and change the amount of openings of opening 5a of a cope plate 5 according to rotation of a magnet 1.

[0023] The rotation position of the magnet 1 of drawing 3 is in the state which closed opening 5a by the quantity of light regulation wings 8 and 9, and the rotation position of the magnet 1 of drawing 4 is in the quantity of light regulation wing 8 and the state which is the position which shunted 9 beam opening 5a, and is changing opening 5a into the open state.

[0024] With a foreland board, 9 maintains predetermined space between cope plates 5, and holds the aforementioned quantity of light regulation wings 8 and 9 possible [ movement ] to this space.

[0025] If it energizes in a coil 2 from the state of drawing 3 and the auxiliary stator 4 which are the south pole and an inside magnetic pole about outside magnetic pole 3a of a stator 3 is excited to the N pole, the energization force of the torsion spring 6 is resisted according to the amount of current passed in a coil 2, and a magnet 1 rotates counterclockwise, will become a desired rotation position, will rotate the quantity of light regulation wings 7 and 8, and will adjust the amount of openings. If the current to a coil 2 is made into maximum, it will become the position of the magnet 1 shown in drawing 4, and opening 5a will become the maximum opening which is not interrupted by the aforementioned quantity of light regulation wings 8 and 9. If the current to a coil 2 is cut, it will be in the state which shows in drawing 3, and the quantity of light regulation wings 7 and 8 will cover opening 5a of a cope plate 5.

[0026] If light exposure can be adjusted and it uses as a drawing regulatory mechanism of a video camera by changing the resistance welding time to a coil if it uses as shutter equipment of a camera, it will become the quantity of light adjustment which can adjust light exposure by changing the energization current value to a coil 2.

[0027] Since it is located in the place from which drive pin 1d was separated with the outside magnetic pole, even if you constitute a drive pin from material of a permanent magnet and a drive pin is magnetized, let electromagnetic force in the drive pin section to generate be the actuator by which did not affect the output characteristics of the whole magnet very small, but shutter equipment was stabilized. Moreover, since a drive pin is fabricated in one with a magnet, it serves as a few assembly error by the low cost compared with the case where it consists of another parts. Moreover, since a drive pin can be arranged in the position which overlaps an outside

magnetic pole about the axis of rotation of a magnet, length L (refer to drawing 2 ) of the shaft orientations of this outline cylindrical shape-like actuator can also be stopped low.

[0028] It becomes the compact actuator which does not occupy many ranges on a cope plate about the size shown by H in drawing 3 since the aforementioned coil is arranged in the above-mentioned composition at a magnet and shaft orientations. again Since it becomes the magnetic path which sandwiches a magnet in the outside magnetic pole section which counters the peripheral face and inner skin of a magnet, and the inside magnetic pole section Since the line of magnetic force which magnetic reluctance generates with a coil few again acts on a magnet effectively, it can become the high actuator of an output and can consider as the quantity of light adjustment equipped with the operating characteristic compact [ as a result ] and stabilized.

[0029] Since the gear tooth which extends to the shaft orientations and the parallel direction of a magnet 1 constitutes the outside magnetic pole of a stator 3, the diameter of a stator 3 can be held down to the minimum size which applied the thickness of a magnetic gap and oneself to the magnet diameter, and let it be the actuator of a minor diameter very much.

[0030]

[Effect of the Invention] As a full account was given above, according to this invention, it is magnetized by turns by the pole where peripheral faces divide and differ in a hoop direction at least, and has the magnet which can rotate focusing on the center of rotation. The outside magnetic pole section which arranges a coil to the shaft orientations of this magnet, and is excited with the aforementioned coil The driving gear with which the inside magnetic pole section consists of the stator and the aforementioned magnet which countered the peripheral face and inner skin of the aforementioned magnet, and a wing drive pin constituted in one, and the cope plate equipped with opening, By having constituted the quantity of light adjustment from a quantity of light regulation wing which drives by the wing drive pin of the aforementioned driving gear, and adjusts the amount of openings of opening of the aforementioned cope plate Since it becomes the magnetic path which sandwiches a magnet in the outside magnetic pole section which counters the peripheral face and inner skin of a magnet, and the inside magnetic pole section In order that the line of magnetic force which magnetic reluctance generates with a coil few again may act on a magnet effectively, it becomes the high actuator of an output and becomes shutter equipment equipped with the operating characteristic compact [ as a result ] and stabilized.

[0031] Moreover, since a drive pin is fabricated in one with a magnet, it serves as a few assembly error by the low cost compared with the case where it consists of another parts. Since the gear tooth which extends to the shaft orientations and the parallel direction of a magnet 1 constitutes the outside magnetic pole of a stator 3, the diameter of a stator 3 can be held down to the minimum size which applied the thickness of a magnetic gap and oneself to the magnet diameter, and let it be the actuator of a minor diameter very much.

[0032] Moreover, equip the above with the motor of a publication and the outside magnetic pole section of the aforementioned stator is constituted in a quantity of light adjusting device by the gear tooth which counters only the predetermined angle range at the periphery section of the aforementioned magnet. By being formed in the range of the magnet with which the aforementioned outside magnetic pole has not countered, the aforementioned wing drive pin constituted by the aforementioned magnet in one Drive pin 1d An outside magnetic pole Since it is located with \*\*\*\*\* at the time, even if you constitute a drive pin from material of a permanent magnet and a drive pin is magnetized, let electromagnetic force in the drive pin section to generate be the actuator by which did not affect the output characteristics of the whole magnet very small, but shutter equipment was stabilized.

[0033] Moreover, since a drive pin can be arranged in the position which overlaps an outside magnetic pole about the axis of rotation of a magnet, length L of the shaft orientations of this outline cylindrical shape-like actuator can also be stopped low.

[0034] Since the aforementioned coil is arranged in the above-mentioned composition at a magnet and shaft orientations, it becomes the compact actuator which does not occupy many ranges on a cope plate about the size shown by H in drawing 3 .

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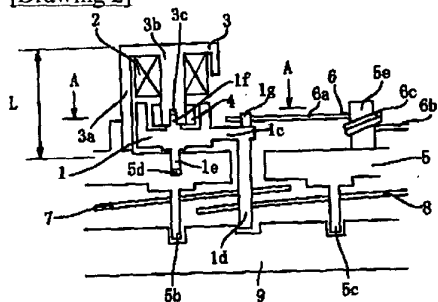
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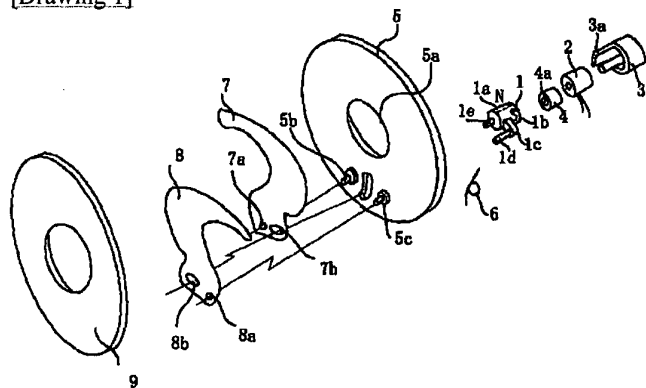
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## DRAWINGS

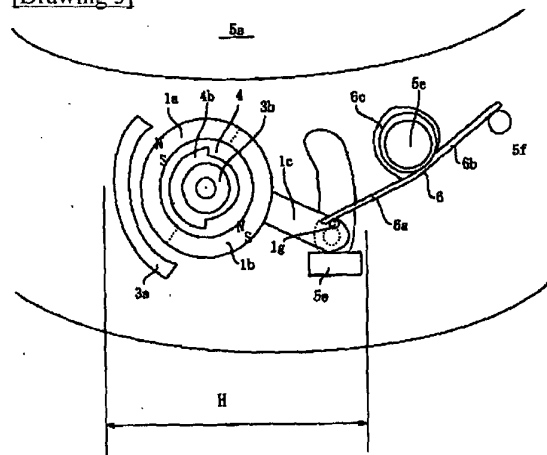
[Drawing 2]



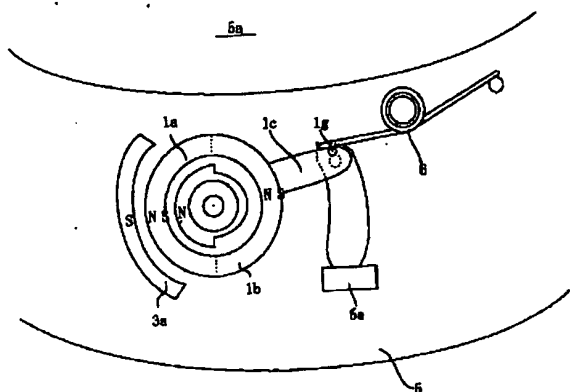
[Drawing 1]



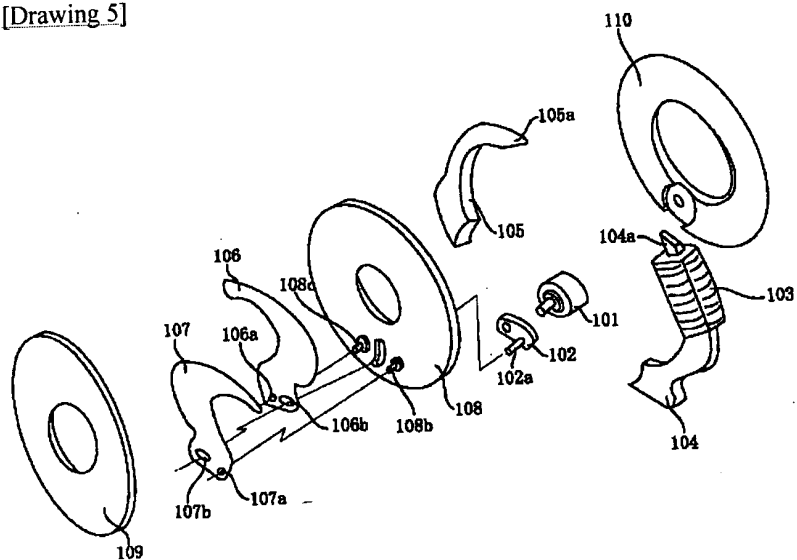
[Drawing 3]



[Drawing 4]



[Drawing 5]



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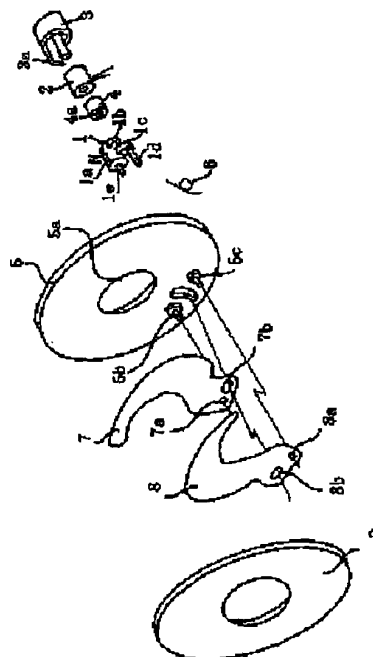
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(54) 【発明の名称】 光量調整装置

(57) 【要約】

【目的】 シャッター装置や絞り装置等の光量調整装置のアクチュエータが地板上において多くの磁圏を占めないコンパクトなものを提供する。

【構成】 光量調整装置は、少なくとも外周面が周方向に分割して異なる極に交互に着磁され回転中心を中心として回転可能なマグネットを備え、該マグネットの軸方向にコイルを配置し、コイルにより励磁される外側磁極部と内側磁極部がマグネットの外周面及び内周面に対向したステータとマグネットと一体的に構成された羽根駆動ピンとからなる駆動装置と、開口部を備えた地板と、駆動装置の羽根駆動ピンにより駆動され地板の開口部の開口量を調節する光量調節羽根とを備える。



## 【特許請求の範囲】

【請求項1】少なくとも外周面が周方向に分割して異なる極に交互に着磁され回転中心を中心として回転可能なマグネットを備え、該マグネットの軸方向にコイルを配置し、前記コイルにより励磁される外側磁極部と内側磁極部が前記マグネットの外周面及び内周面に対向したステータと前記マグネットと一体的に構成された羽根駆動ピンとからなる駆動装置と、開口部を備えた地板と、前記駆動装置の羽根駆動ピンにより駆動され前記地板の開口部の開口量を調節する光量調節羽根とを備えた光量調節装置。

【請求項2】請求項1記載の光量調節装置において、前記ステータの外側磁極部は前記マグネットの外周部に所定の角度範囲のみに対向する歯により構成され、前記マグネットに一体的に構成された前記羽根駆動ピンは前記外側磁極部が対向していないマグネットの範囲に形成されている事の特徴とする光量調節装置。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、カメラのシャッター特にレンズシャッターカメラのシャッター装置やビデオカメラの絞り装置等の光量調節装置に関する。

【0002】

【従来の技術】従来のレンズシャッターカメラのシャッター装置としては図5に示すものがある。101は永久磁石、102は駆動レバー、102aは駆動レバーに設けられた駆動ピンである。駆動レバー102は永久磁石101に固着され永久磁石101と一体的に回転する。103はコイル、104、105は軟磁性材料からなりコイルにより励磁されるステータである。ステータ104とステータ105とは104aと105aにおいて接合されており磁気回路上一体となっている。コイル103への通電によりステータ104及びステータ105が励磁され永久磁石101は所定の角度内を回転駆動する。106、107はシャッター羽根であり、108は地板である。シャッター羽根106、107は地板108のピン108a、108bに106a、107aにおいて回転可能に取り付けられ、長穴106b、107bが前記駆動ピン102aに摺動可能に嵌合し、永久磁石101とともに駆動レバー102が回転する事でシャッター羽根106、107は回転中心106a、107aを中心に回転駆動され図示の開口を開閉する。

【0003】この他の形態としてはコストアップを防ぐ為に永久磁石をプラスチックマグネットで形成し駆動ピンを一体的に成形したものもある。109はシャッター羽根106、107を地板108との間で移動可能に保持する前地板であり、110はステータ104、105を保持し永久磁石101を回転可能に保持する後地板である。

【0004】

【発明が解決しようとする課題】上記シャッター装置はコ

イルやステータにより地板の多くの範囲を占めてしまい他のアクチュエータやレンズのガイド等を配置する事が困難になってしまう。

【0005】また、上記シャッター装置の永久磁石101は光軸を中心とする円周方向の両隣をステータ104で占められる為に駆動ピン102aを光軸を中心とする円の半径方向に移動するように構成する為には駆動ピン102aは永久磁石101の軸方向に関してステータ104と重複しない位置になるよう構成しなければならない。駆動ピン102aを永久磁石と一体的に成形した場合駆動ピンも着磁されてしまう事が多いのでその場合ステータに近いと出力特性に悪影響を及ぼしてしまう。

【0006】永久磁石101と駆動ピン102aとを別の材質で製造しこれを駆動レバー等を介して接合や圧入で一体化する方法はコストアップを招いたり着磁の位相と駆動ピンの位置との間で組み立て誤差が生じて出力特性が不安定なものとなる傾向がある。

【0007】したがって、本発明の目的はシャッター装置や絞り装置等の光量調節装置のアクチュエータが地板上において多くの範囲を占めないコンパクトなものを提供する事にある。

【0008】また、本発明の目的は出力特性が安定し、しかも低コストの光量調節装置とする事にある。

【0009】

【課題を解決するための手段】上記課題を解決するために、本発明は、第1に、少なくとも外周面が周方向に分割して異なる極に交互に着磁され回転中心を中心として回転可能なマグネットを備え、該マグネットの軸方向にコイルを配置し、前記コイルにより励磁される外側磁極部と内側磁極部が前記マグネットの外周面及び内周面に対向したステータと前記マグネットと一体的に構成された羽根駆動ピンとからなる駆動装置と、開口部を備えた地板と、前記駆動装置の羽根駆動ピンにより駆動され前記地板の開口部の開口量を調節する光量調節羽根とを備えた事の特徴とするものである。

【0010】上記構成において前記コイルはマグネットと軸方向に配置されるので地板上において多くの範囲を占めないコンパクトなアクチュエータとなりマグネットの外周面と内周面に対向する外側磁極部と内側磁極部とでマグネットを挟む磁路となるので磁気抵抗が少なくまたコイルにより発生する磁力線が効果的にマグネットに作用する為出力の高いアクチュエータとなり結果的にコンパクトで安定した動作特性を備えたシャッター装置とする事ができる。

【0011】また、上記課題を解決するために、本発明は、第2に、第1の発明に加え更に前記ステータの外側磁極部は前記マグネットの外周部に所定の角度範囲のみに対向する歯により構成され、前記マグネットに一体的に構成された前記羽根駆動ピンは前記外側磁極部が対向していないマグネットの範囲に形成されている事の特徴とする

ものである。

【0012】駆動ピンは外側磁極とは離れたところに位置する為駆動ピンを永久磁石の材料で構成しても駆動ピン部における発生する電磁力は非常に小さくマグネット全体の出力特性に影響を及ぼさずシャッタ装置の安定したアクチュエータとする事ができる。

【0013】また駆動ピンはマグネットと一体的に成形されるので別部品で構成される場合に比べ低コストで少ない組み立て誤差となる。またマグネットの回転軸に関して外側磁極とは重複する位置に駆動ピンを配置できるので概略円筒形状の本アクチュエータの軸方向の長さを低く抑える事もできる。

【0014】

【実施例】（実施例1）図1～図4は本発明の実施例を示す図であり、そのうち、図1は絞り羽根駆動機構の分解斜視図であり、図2は断面図、図3は非通電時の図2のA-A断面図、図4はコイルへ最大通電時の図2のA-A断面図である。

【0015】1はプラスチックマグネット材料からなり概略円筒形状のマグネットであり少なくとも外周面を円周方向に2分割してS極、N極に分割されている。若磁部1aは外周面がN極、若磁部1bは外周面がS極に若磁されている。

【0016】2は円筒形状のコイルであり、コイル2は前記マグネット1と同心でかつ、マグネット1を軸方向隣り合う位置に配置され、コイル2はその外径が前記マグネット1の外径とほぼ同じ寸法である。

【0017】3は軟磁性材料からなるステータで、ステータ3は外筒および円柱形状の内筒3bからなっている。ステータ3の外筒はその先端部が歯形状の外側磁極3aを形成している。外側磁極3aはマグネット1の外周面に所定の隙間を持って所定の角度のみに対向するように構成されている。本実施例では前記所定の角度は180度以下である。

【0018】4は補助ステータで内径部4aがステータ3の内筒3bに嵌合して囲着されかつ外径部には前記ステータの外側磁極3aに対向した位相に対向部4b部が形成されている。

【0019】ステータ3の円柱形状の内筒3bと補助ステータ4とで内側磁極を構成している。マグネット1には外側磁極3aと対向していない位置に腕1cが一体的に形成されており腕1cの先端には羽根駆動ピン1dが形成されている。また概略円筒状であるマグネット1の軸方向の位置に関して外側磁極3aとは重複する位置に腕1cを配置している。また羽根駆動ピン1dは後述の地板5の開口部5aの中心に向かう或いは離れる方向すなわち半径方向に概略移動するように配置されている。

【0020】5は本光量調節装置の地板である。地板は開口部5aを備えている。前記マグネット1は軸部1eが地板5の5d部に回転可能に嵌合し軸部1fがステータ3

の穴3c部に回転可能に嵌合し取り付けられている。ステータ3は外側磁極3a部において地板5に固定されている。

【0021】6はトーションスプリングで内径部6cが地板5のダボ5eに嵌まり腕6bは地板5のダボ5fに固定され腕6aがマグネット1の腕1c上のピン1gに当接し図3においてマグネット1を時計回り方向に付勢する。マグネット1の腕はこの状態では地板5の突起部5eに腕1cが当接し係止される。図3に示すこの状態はコイル2への通電がなされていない状態である。

【0022】7、8は光量調節羽根であり穴7a、8aがそれぞれ地板5のピン5b、5cに回転可能に嵌合している。また長穴7b、8bはマグネット1の駆動ピン1dに摺動可能に嵌合しておりマグネット1の回転に応じて地板5の開口部5aの開口量を変化させる。

【0023】図3のマグネット1の回転位置は光量調節羽根8、9により開口5aを閉じた状態であり図4のマグネット1の回転位置は光量調節羽根8、9は開口5aより待避した位置であり開口部5aを開放状態にしている状態である。

【0024】9は前地板で地板5との間に所定の空間を保ち該空間に前記光量調節羽根8、9が移動可能に保持するものである。

【0025】図3の状態からコイル2に通電を行ないステータ3の外側磁極3aをS極、内側磁極である補助ステータ4をN極に励磁するとコイル2に流す電流量に応じてトーションスプリング6の付勢力に抗してマグネット1は反時計回りに回転し所望の回転位置になり光量調節羽根7、8を回転させ開口量を調節する。コイル2への電流を最大値にすると図4に示すマグネット1の位置になり開口5aは前記光量調節羽根8、9により遮られない最大開口となる。コイル2への電流を切れば図3に示す状態になり光量調節羽根7、8は地板5の開口5aを遮蔽する。

【0026】カメラのシャッタ装置として用いるのならばコイルへの通電時間を変化させる事で露光量を調節する事ができ、ビデオカメラの絞り調節機構として用いるのであればコイル2への通電電流値を変更する事により露光量を調節する事ができる光量調節装置となる。

【0027】駆動ピン1dは外側磁極とは離れたところに位置する為駆動ピンを永久磁石の材料で構成し駆動ピンが若磁されても駆動ピン部における発生する電磁力は非常に小さくマグネット全体の出力特性に影響を及ぼさずシャッタ装置の安定したアクチュエータとする事ができる。また駆動ピンはマグネットと一体的に成形されるので別部品で構成される場合に比べ低コストで少ない組み立て誤差となる。またマグネットの回転軸に関して外側磁極とは重複する位置に駆動ピンを配置できるので概略円筒形状の本アクチュエータの軸方向の長さL(図2参照)を低く抑える事もできる。

【0028】上記構成において前記コイルはマグネットと軸方向に配置されるので図3においてHで示す寸法に関して地板上において多くの範囲を占めないコンパクトなアクチュエータとなりました。マグネットの外周面と内周面に対向する外側磁極部と内側磁極部とでマグネットを挟む磁路となるので磁気抵抗が少なくまたコイルにより発生する磁力線が効果的にマグネットに作用する為出力の高いアクチュエータとなり結果的にコンパクトで安定した動作特性を備えた光量調節装置とする事ができる。

【0029】ステータ3の外側磁極をマグネット1の軸方向と平行方向に延出する歯により構成しているのでステータ3の直径はマグネット直径に磁気ギャップと自らの肉厚を加えた最小限の寸法に抑える事ができ非常に小径のアクチュエータとする事ができる。

【0030】

【発明の効果】以上詳記したように、本発明によれば、少なくとも外周面が周方向に分割して異なる極に交互に若磁され回転中心を中心として回転可能なマグネットを備え、該マグネットの軸方向にコイルを配置し、前記コイルにより励磁される外側磁極部と内側磁極部が前記マグネットの外周面及び内周面に対向したステータと前記マグネットと一体的に構成された羽根駆動ピンとからなる駆動装置と、開口部を備えた地板と、前記駆動装置の羽根駆動ピンにより駆動され前記地板の開口部の開口量を調節する光量調節羽根とから光量調節装置を構成した事により、マグネットの外周面と内周面に対向する外側磁極部と内側磁極部とでマグネットを挟む磁路となるので磁気抵抗が少なくまたコイルにより発生する磁力線が効果的にマグネットに作用する為出力の高いアクチュエータとなり結果的にコンパクトで安定した動作特性を備えたシャッタ装置となる。

【0031】また駆動ピンはマグネットと一体的に成形されるので別部品で構成される場合に比べ低コストで少ない組み立て誤差となる。ステータ3の外側磁極をマグネット1の軸方向と平行方向に延出する歯により構成しているためステータ3の直径はマグネット直径に磁気ギャップと自らの肉厚を加えた最小限の寸法に抑える事ができ\*

\*非常に小径のアクチュエータとする事ができる。

【0032】また上記に記載のモータを備え光量調整装置において、前記ステータの外側磁極部は前記マグネットの外周部に所定の角度範囲のみに対向する歯により構成され、前記マグネットに一体的に構成された前記羽根駆動ピンは前記外側磁極部が対向していないマグネットの範囲に形成されている事により、駆動ピン1dは外側磁極とは離れたところに位置する為駆動ピンを永久磁石の材料で構成し駆動ピンが若磁されても駆動ピン部における発生する電磁力は非常に小さくマグネット全体の出力特性に影響を及ぼさずシャッタ装置の安定したアクチュエータとする事ができる。

【0033】また、マグネットの回転軸に関して外側磁極とは重複する位置に駆動ピンを配置できるので概略円筒形状の本アクチュエータの軸方向の長さしを低く抑える事もできる。

【0034】上記構成において前記コイルはマグネットと軸方向に配置されるので図3においてHで示す寸法に関して地板上において多くの範囲を占めないコンパクトなアクチュエータとなる。

【図面の簡単な説明】

【図1】図1は本発明の実施例の光量調節装置の分解斜視図である。

【図2】図2は光量調節装置の断面図である。

【図3】図3は非通電時の図2のA-A断面図である。

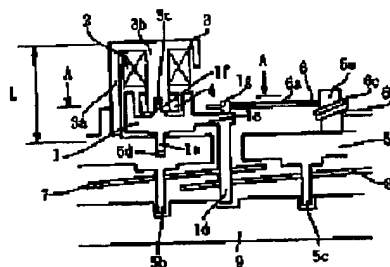
【図4】図4はコイルへ最大通電時の図2のA-A断面図である。

【図5】図5は従来のシャッタ羽根駆動装置である。

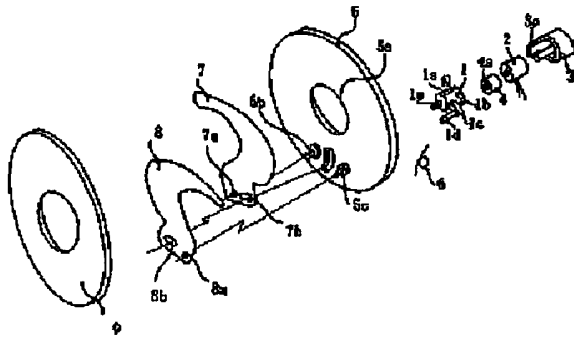
【符号の説明】

- |      |            |
|------|------------|
| 1    | マグネット      |
| 2    | コイル        |
| 3    | ステータ       |
| 4    | 補助ステータ     |
| 5    | 地板         |
| 6    | トーションスプリング |
| 7, 8 | 羽根         |
| 9    | 前地板        |

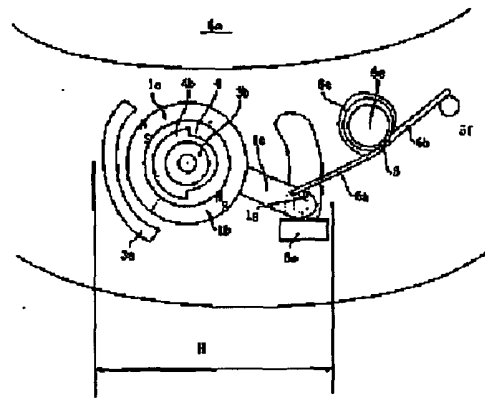
【図2】



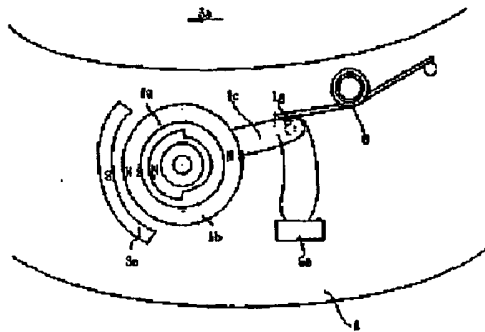
【図1】



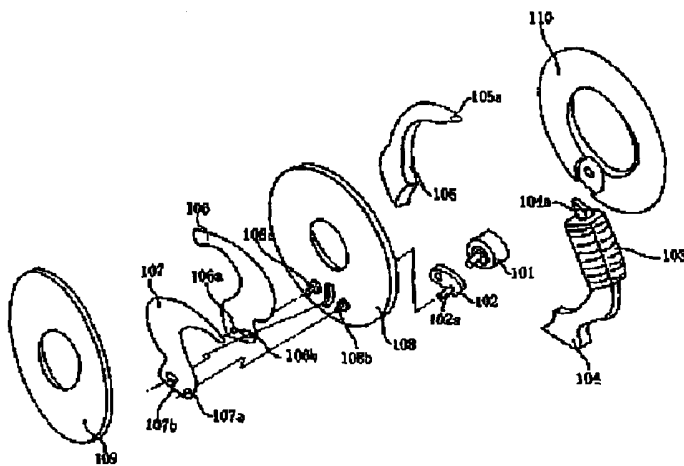
【図3】



【図4】



【図5】



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